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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/563,495	01/04/2006	Malcolm David Macleod	05-1094	8270
20306 7590 09/24/2007 MCDONNELL BOEHNEN HULBERT & BERGHOFF LLP 300 S. WACKER DRIVE 32ND FLOOR CHICAGO, IL 60606			EXAMINER LY, HIEN QUANG	
			ART UNIT 3662	PAPER NUMBER
			MAIL DATE 09/24/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/563,495	Applicant(s) MACLEOD, MALCOLM DAVID	
	Examiner Hien Ly	Art Unit 3662	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 January 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 January 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|-------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>08/28/2006</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims **1, 10, and 20** are rejected under 35 U.S.C. 102(b) as being anticipated by **Margerum ('4,481,519)**.

Regarding claims **1, 10, and 20**, Margerum discloses:

- A plurality of antennas. See FIG.1 (" antennas 12-14"). Column 2, line 56.
- Measuring apparatus for determining individual antenna signal strength. See FIG. 1 ("switch 39"). See column 3, lines 40-41.
- A combining circuit for deriving combined antenna signal strengths by forming combinations of first and second antenna signals derived from different antennas. See FIG. 1("pairs of antennas 12-14 or 13-14 and phase detector 60 "). Column 2, lines 59-65 and column 4, lines 59-63.
- The second antenna signal fed in two sets with signal in one set having a on-zero phase difference relative to signals the other set. See FIG. 1(" 90° hybrid junction 20, a pair of output terminals 22-24"). Column 3, lines 12-24.

- Digital signal processing apparatus for determining at least one emitter bearing from antenna signal strengths. See FIG. 1("phase detector 60, a digital converter 62, digital computer 66"). Column 4, line 59-63.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims **1, 3-8, 10, 12-17, and 20** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Margerum** and further in view of **Harris ('2,831,187)**.

Regarding **claims 1, 10, and 20**, in the event that Margerum fails to disclose means for determining individual antenna signal strength. Harris successfully discloses the signal strength indicator for individual antenna. See FIG. 1(" signal strength indicator 104"). Column 2, line 9-10.

It would have been obvious to modify Margerum to include means for determining individual antenna signal strength in teaching of Harris in order to efficiently provide a system by which the presence of short-wave radio signals from all azimuths can be detected and the approximate bearings from their source determined.

Regarding **claims 3 and 12**, Margerum discloses the means for determining emitter bearing arranged to derive a relationship between antenna signal strengths and emitter bearing and to determine emitter bearing therefrom. See FIG. 1 ("phase detector 60"). Column 4, line 59-63.

Regarding **claims 4 and 13**, Margerum discloses the means for determining individual antenna signal strengths and the combining means as previously discussed in claim 1 and 3.

Margerum further discloses the relative phase difference in the range 30 to 120 degrees. See FIG. 1 ("90° hybrid junction 20, a pair of output terminals 22-24"). Column 3, lines 12-24.

Regarding **claims 5 and 14**, Margerum discloses the relative phase difference substantially 90 degrees. See FIG. 1 ("90° hybrid junction 20, a pair of output terminals 22-24"). Column 3, lines 12-24.

Regarding **claims 6 and 15**, Margerum discloses the combination means arranged to combine antenna signals with equal gain magnitude and with equal and unequal phase. See column 3, lines 17-20, equations 3 and 4.

Equations 3 and 4 described E22 and E24 having the equal gains magnitude $A/\sqrt{2}$ and with equal and unequal phase $\pi/4$.

Regarding **claims 7 and 16**, Margerum discloses the combining means incorporating phase shifting means switchable into and output path. See FIG. 1 ("switch 26 and switch 40, 90° hybrid 20 and 180° hybrid 44"). See column 4, lines 13-21.

Regarding claims **8 and 17**, Margerum inherently teaches the combining means incorporating an adder having two inputs both switchably connected to individual signal paths extending to respective antenna. See FIG. 1 ("phase detector 60"). See column 6, lines 45-51 ("the difference in phase").

It is well known to one skilled in the art that the summation or subtraction circuit, which is read as an adder, determines the difference in phase.

5. Claims **2 and 11** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Margerum** and further in view of **Kuwahara ('6,278,406)**.

Regarding claims **2 and 11**, Margerum in view of Harris fail to disclose the means for determining emitter bearing arranged to derive covariance matrix from antenna signal strengths and to determine emitter-bearing therefrom.

However, Kuwahara discloses the means for determining emitter bearing arranged to derive covariance matrix from antenna signal strengths and to determine emitter-bearing therefrom. See FIG. 1(" covariance matrix creating process 6"). Column 5, line 7-10.

It would have been obvious to modify Margerum in view of Harris to include a derived covariance matrix to determine emitter-bearing in teaching of Kuwahara in order to efficiently measure the incoming angles of plurality incident signals to the array antenna in multipath environments.

6. Claims **8 and 17** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Margerum** and further in view of **Ghose ('4,486,757)**.

Regarding claims **8 and 17**, in the event that Margerum fails to disclose the combining means incorporating an adder having two inputs both switchably connected to individual signal paths extending to respective antenna. Ghose successfully discloses the combining means incorporating an adder having two inputs both switchably connected to individual signal paths extending to respective antenna. See FIG. 1(" the adder stage 28 and the subtractor stage 30"). See column 4, line 1-15.

It would have been obvious to modify Margerum to include the combining means incorporating an adder having two inputs both switchably connected to individual signal paths extending to respective antenna in teaching of Ghose in other to efficiently create an indicator means responsive to the error correction loop means for computing and displaying an off-boresight direction the electromagnetic signal.

7. Claims **9 and 18-19** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Margerum** and further in view of **Rose ('5,574,468)**.

Regarding **claims 9 and 18-19**, Margerum discloses:

- The means for determining individual antenna signal strengths comprising a first multiple switch having input poles connected to receive signal from respective antenna. See FIG. 3 ("switch 39"). Column 3, lines 40-41.

Margerum fails to disclose a second multipole switch having input poles connected ton receive signals from respective antenna.

However, Rose successfully discloses a second multipole switch having input poles connected to receive signals from respective antenna. See FIG. 2a ("switches 22 and 24"). Column 5, lines 42-48 "antenna elements 12a-18a connected to 4PST switch 22 and antenna elements 12b-18b connected to 4PST switch 24").

It would have been obvious to modify Margerum to include a second multipole switch having input poles connected to receive signals from respective antenna in teaching of Rose in order to efficiently improve the DF accuracy or the gross error rate performance of linear and planar array while not requiring a change in the fundamental design methods.

In view of Rose, Margerum further discloses:

- A third multiple switch for switching phase shifting means into and out of antenna signal path. See FIG. 1 ("switch 26"). Column 3, lines 25-27.
- The combination means incorporating adding means for combining signals, the adding means being arranged to add an antenna signal in a first path extending via the first multipole switch to another antenna signal in the second signal path extending via the second and the third multipole switch. See FIG. 1 ("pairs of antennas 12-14 or 13-14 and phase detector 60 "). Column 2, lines 59-65 and column 4, lines 59-63.

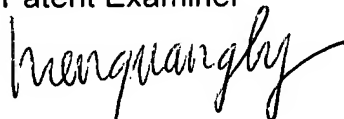
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hien Ly whose telephone number is 571-270-1326. The examiner can normally be reached on M-F: 7:00am - 4:00pm (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, THOMAS H. TARCZA can be reached on 571-272-6979. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Patent Examiner



Hien Ly

August 21, 2007



THOMAS H. TARCZA
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 3600